Strategic Planning and Outcomes

Materials Science Division
Argonne National Laboratory

Kickoff: MSD Strategic Planning Retreat

Entire division attended for full day March 10, 2004

Outcomes: Greater awareness of breadth of MSD. Model for strategic planning meetings, spontaneous discussion groups, etc.

Grand Challenges for Fundamental Science

Mechanism of High-T_c Superconductivity
Photoemission, tunneling and theory papers: ~3100 citations

Atomic and Molecular Basis of Catalysis
New hire Nenad Markovic through newly funded BES hydrogen initiative

Origin of the Universe
Ultra-sensitive mass spectrometry and presolar grain extraction by Davis, Lewis, and Clayton (UC) to analyze stardust from our sun via Genesis spacecraft---NASA funding for 15 years

Emerging Science Frontiers

Energy Transduction in Biomolecular Materials
Harnessing functionality of membrane proteins for nanoscale devices.
Outcome:BES funded new initiative FY03

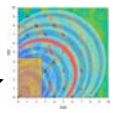
Molecular-spin Qubits for Quantum Computing
Workshop 2003 F. Fradin with CHM, BIO, NWU
Outcomes: LDRD; BES funded new initiative FY05

Science Driving Facilities

Scattering Science

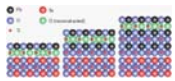
MSD proposed aberration-corrected microscopy to DOE and organized first workshop on TEAM concept

Creating Novel Capabilities
- Powder Diffraction at APS
- Single Crystal Neutron Diffuse Scattering
- Spin-Echo Resolved Grazing Incidence Neutron Scattering



In-situ Experiments

In-situ XRD at APS: 3 unit-cell thick $PbTiO_3$ films are ferroelectric



In-situ Lorentz microscopy - new hire Amanda Petford-Long

MSD Strategic Science Partnerships

Diffuse Scattering with APS, NIU, MCS
Strongly Correlated Electrons with APS, UIC, NIU, IIT
Sensor Arrays for Cosmic Background with CNM, UC
Institute of Catalysis for Energetic Processes with NWU
Manganite Surfaces with UIC, UIUC, APS
Digital Synthesis with UIUC

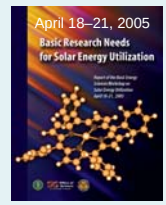
Science and Materials for Energy

MSD helps BES shape its energy mission through strategic planning partnerships

G. Crabtree co-chaired workshop. L. Curtiss and C. Marshall (CMT) coordinated hydrogen initiative. MSD proposal funded.

Opportunities for Catalysis, 2002

Proposal with CHM, NWU funded 2004



G. Crabtree co-chaired workshop U. Welp and D. Tiede (CHM) are coordinating ANL solar initiative

Proactively, MSD and Notre Dame organized Workshop on Possibility of Room Temperature Superconductivity

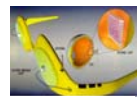
W. Kwok and J. Sarrao (LANL) organizing next BES workshop on superconductivity

Materials Synthesis Network J. Mitchell co-authored workshop report with national lab and university partners

Translation to Applications

Commercial Spin-offs

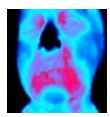
Spin-off company, Advanced Diamond Technologies, formed to exploit ultrananocrystalline diamond (UNCD) opportunities



Artificial retina with Second Sight using biocompatible UNCD

Fast sensitive H_2 sensors with Makel Engineering for hydrogen economy safety

Engineering Center in Nanomagnetics with NWU, UIUC
Sensor Arrays for Cosmic Background with CNM, UC
Nanomedicine with UC, NWU, UIC, UIUC (NIH RFP)
THz Sources with IIT, Tohoku U (Japan) LDRD funding
NSF funded work on hydrogen sensors with UIC



Infrared Imaging for Cancer Therapy
Collaboration of V. Novosad and E. W. Cohen, M.D. (UC Hospitals) imaged 5 patients.
Outcome: R21-type NIH proposal

Coordinated Characterization of Coated Conductors
Conceptual planning D. Miller & K. Gray (MSD) and V. Maroni (CMT).
Industrial partners American Superconductor and SuperPower
Outcome: ongoing DOE-EERE funding started in FY05

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